

## Form INV-2 EMISSION POINT DESCRIPTION

Duplicate this form for EACH  
Emission POINT

1) Company/Facility Name	Grain Elevator Inc			1a) Form INV-2 Page		of	
2) Emission Point Number	EP-2						
3) Emission Point Description	Column Grain Dryer Emissions						
4) Is this stack/vent used as an Emergency Bypass Stack?	No	<input checked="" type="checkbox"/>	Yes	<input type="checkbox"/>			
If YES, for which stack(s)? List Emission Point Nos.:							
EMISSION POINT INFORMATION							
5) Emission Point Type							
Stack/Vent	<input type="checkbox"/>						
Fugitive (specify)	<input type="checkbox"/>						
Other (specify)	<input checked="" type="checkbox"/>	Emissions through sidewall of dryer					
6) Stack Shape and Dimensions: (interior dimensions at exit point)							
Circular Diameter:	<input type="checkbox"/>		inches				
Rectangular Dimensions:	<input type="checkbox"/>		inches	X		inches	
Other Dimensions	<input type="checkbox"/>		inches				
7) Stack Height Above Ground			feet				
8) Does the Emission Point have a rain cap (or anything else) which obstructs the flow of gases leaving the Emission Point, or a horizontal discharge?							
No	<input type="checkbox"/>	YES (specify):	<input type="checkbox"/>				
9) COMPOSITION OF EXHAUST STREAM							
Exhaust Stream Characteristics	Emission Point Composition of Exhaust Stream			Units of Measure			
a) Flow Rate	50,000			<input checked="" type="checkbox"/> ACFM <input type="checkbox"/> SCFM			
b) Temperature	200			Degree Fahrenheit			
10) BYPASS STACKS							
Bypass Stack – Emission Point No.		Bypass Stack Description					
Bypass Stack – Emission Point No.		Bypass Stack Description					
11) LIST OF EMISSION UNITS VENTING THROUGH THIS EMISSION POINT							
Emission Unit No.	Emission Unit No.		Emission Unit No.		Emission Unit No.		
EU-2							

Duplicate this form as needed

TYPE ALL INFORMATION

(DNR Form 542-4004. November 1, 2006)

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## Form INV-3 EMISSION UNIT DESCRIPTION – POTENTIAL EMISSIONS

Duplicate this form for EACH  
Emission UNIT

1)	Company/Facility Name	Grain Elevator Inc				1a)	Form INV-3	Page		of									
2)	Emission Point Number	EP-2																	
EMISSION UNIT (PROCESS) IDENTIFICATION & DESCRIPTION																			
3)	Emission Unit Number	EU-2																	
4)	SCC Number	30200527																	
5)	Description of Process	Column Grain Drying																	
6)	Date of Construction	3-1-1957		7)	Date of Installation	3-1-1957		8)	Date of Modification										
9)	Raw Material – OR Fuels Used List worst case for EACH pollutant	Corn																	
10)	Federally Enforceable Limit	50 tons PM <sub>10</sub> /yr for the entire facility																	
11)	Permit or Rule Establishing Limit	08-A-000																	
12)	Maximum Hourly Design Rate	84				Tons				Per Hour									
13)	AIR POLLUTION CONTROL EQUIPMENT (CE)																		
Control Equipment Number																			
Control Equipment Description																			
Control Equipment Number																			
Control Equipment Description																			
POTENTIAL EMISSIONS																			
14	Air Pollutant	15	Emission Factor	16	Emission Factor Units	17	Source of E.F.	18	Ash or Sulfur %	19	Potential Hourly Uncontrolled Emissions (Lbs/Hr)	20	Combined Control Efficiency	21	Transfer Efficiency	22	Potential Hourly Controlled Emissions (Lbs/Hr)	23	Potential Annual Emissions (Tons/Yr)
	PM-2.5		.0094		Lbs/ton		AP-42				.79								2.35
	PM-10		.055		Lbs/ton		AP-42				4.62								13.75
	SO <sub>2</sub>																		
	NOx																		
	VOC																		
	CO																		
	Lead																		
	Ammonia																		
POTENTIAL EMISSIONS - HAPs and additional regulated air pollutants – list the pollutant name in Column 14																			

\*Sources of Emission Factors: CEM .. Stack Test .. Mass Balance .. AP-42 .. WebFIRE.. TANKS.. EPA-L&amp;E .. Worksheet .. Other – Specify

Duplicate this form as needed

TYPE ALL INFORMATION

(DNR Form 542-4001. November 1, 2006)

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## Form INV-3 EMISSION UNIT DESCRIPTION – POTENTIAL EMISSIONS

Duplicate this form for EACH  
Emission UNIT

1) Company/Facility Name	Grain Elevator Inc.				1a) Form INV-3	Page		of	
2) Emission Point Number	EP-2								
EMISSION UNIT (PROCESS) IDENTIFICATION & DESCRIPTION									
3) Emission Unit Number	EU-2								
4) SCC Number	10200602								
5) Description of Process	Natural Gas Combustion								
6) Date of Construction	3-1-57		7) Date of Installation	3-1-57		8) Date of Modification			
9) Raw Material – OR Fuels Used List worst case for EACH pollutant	Natural Gas								
10) Federally Enforceable Limit	50 tons PM <sub>10</sub> /yr for the entire facility								
11) Permit or Rule Establishing Limit	08-A-000								
12) Maximum Hourly Design Rate	.0933		MMcf				Per Hour		
13) AIR POLLUTION CONTROL EQUIPMENT (CE)									
Control Equipment Number									
Control Equipment Description									
Control Equipment Number									
Control Equipment Description									
POTENTIAL EMISSIONS									
14 Air Pollutant	15 Emission Factor	16 Emission Factor Units	17 Source of E.F.	18 Ash or Sulfur %	19 Potential Hourly Uncontrolled Emissions (Lbs/Hr)	20 Combined Control Efficiency	21 Transfer Efficiency	22 Potential Hourly Controlled Emissions (Lbs/Hr)	23 Potential Annual Emissions (Tons/Yr)
PM-2.5									
PM-10									
SO <sub>2</sub>	0.6	Lbs/MMcf	AP-42		.06				.09
NOx	100	Lbs/MMcf	AP-42		9.33				14.45
VOC	5.5	Lbs/MMcf	AP-42		.51				.79
CO	84	Lbs/MMcf	AP-42		7.84				12.14
Lead									
Ammonia	3.2	Lbs/MMcf	WebFIRE		.30				.46
POTENTIAL EMISSIONS - HAPs and additional regulated air pollutants – list the pollutant name in Column 14									
Hexane	1.8	Lbs/MMcf	AP-42		.17				.26
Formaldehyde	.075	Lbs/MMcf	AP-42		.01				.01

\*Sources of Emission Factors: CEM .. Stack Test .. Mass Balance .. AP-42 .. WebFIRE.. TANKS.. EPA-L&amp;E .. Worksheet .. Other – Specify

Duplicate this form as needed

TYPE ALL INFORMATION

(DNR Form 542-4001. November 1, 2006)

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## Form INV-4 EMISSION UNIT DESCRIPTION – ACTUAL EMISSIONS

Duplicate this form for EACH  
Emission UNIT

1) Company/Facility Name	Grain Elevator Inc.			1a) Form INV-4	Page		of	
2) Emission Year	20--	3) Emission Point Number	EP-2					
EMISSION UNIT – ACTUAL OPERATIONS AND EMISSIONS								
4) Emission Unit Number	EU-2			5) SCC Number	30200527			
6) Description of Process	Column Grain Drying							
ACTUAL THROUGHPUT								
7) Raw Material	Corn							
8) Actual Throughput – Yearly Total	25,000	9)	Units Raw Material	Tons				
Actual Operating Rate/Schedule								
	10) Percent of Total Operating Time	11) Hours/Day	12) Days/Week	13) Weeks/Quarter				
JAN – MAR	10	10	5	4				
APR – JUN	0	0	0	0				
JUL – SEP	10	10	5	4				
OCT – DEC	80	16	6	13				
14) AIR POLLUTION CONTROL EQUIPMENT (CE)								
Control Equipment Number								
Control Equipment Description								
Control Equipment Number								
Control Equipment Description								
ACTUAL EMISSIONS								
15 Air Pollutant	16 Emission Factor	17 Emission Factor Units	18 Source of E.F.	19 Ash or Sulfur %	20 Combined Control Efficiency	21 Transfer Efficiency	22 Actual Emissions (Tons/Yr)	
PM-2.5	.0094	Lbs/ton	AP-42				.12	
PM-10	.055	Lbs/ton	AP-42				.69	
SO <sub>2</sub>								
NOX								
VOC								
CO								
Lead								
Ammonia								
ACTUAL EMISSIONS - HAPs and additional regulated air pollutants – list the pollutant name in Column 15								

\*Sources of Emission Factors: CEM .. Stack Test .. Mass Balance .. AP-42 .. WebFIRE.. TANKS.. EPA-L&amp;E .. Worksheet .. Other – Specify

Duplicate this form as needed

TYPE ALL INFORMATION

(DNR Form 542-4002 November 1, 2006)

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## Form INV-4 EMISSION UNIT DESCRIPTION – ACTUAL EMISSIONS

Duplicate this form for EACH  
Emission UNIT

1) Company/Facility Name	Grain Elevator Inc.			1a) Form INV-4 Page		of	
2) Emission Year	20--	3) Emission Point Number	EP-2				
EMISSION UNIT – ACTUAL OPERATIONS AND EMISSIONS							
4) Emission Unit Number	EU-2			5) SCC Number	10200602		
6) Description of Process	Natural Gas Combustion						
ACTUAL THROUGHPUT							
7) Raw Material	Natural Gas						
8) Actual Throughput – Yearly Total	17.75	9)	Units Raw Material	MMcf			
Actual Operating Rate/Schedule							
	10) Percent of Total Operating Time	11) Hours/Day	12) Days/Week	13) Weeks/Quarter			
JAN – MAR	10	10	5	4			
APR – JUN	0	0	0	0			
JUL – SEP	10	10	5	4			
OCT – DEC	80	16	6	13			
14) AIR POLLUTION CONTROL EQUIPMENT (CE)							
Control Equipment Number							
Control Equipment Description							
Control Equipment Number							
Control Equipment Description							
ACTUAL EMISSIONS							
15 Air Pollutant	16 Emission Factor	17 Emission Factor Units	18 Source of E.F.	19 Ash or Sulfur %	20 Combined Control Efficiency	21 Transfer Efficiency	22 Actual Emissions (Tons/Yr)
PM-2.5							
PM-10							
SO <sub>2</sub>	0.6	Lbs/MMcf	AP-42				.01
NOX	100	Lbs/MMcf	AP-42				.89
VOC	5.5	Lbs/MMcf	AP-42				.05
CO	84	Lbs/MMcf	AP-42				.75
Lead							
Ammonia	3.2	Lbs/MMcf	WebFIRE				.03
ACTUAL EMISSIONS - HAPs and additional regulated air pollutants – list the pollutant name in Column 15							
Hexane	1.8	Lbs/MMcf	AP-42				.02
Formaldehyde	.075	Lbs/MMcf	AP-42				.00

\*Sources of Emission Factors: CEM .. Stack Test .. Mass Balance .. AP-42 .. WebFIRE.. TANKS.. EPA-L&amp;E .. Worksheet .. Other – Specify

Duplicate this form as needed

TYPE ALL INFORMATION

(DNR Form 542-4002 November 1, 2006)

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## Form INV-5 CALCULATIONS

Duplicate this form for each Form it will  
accompany in the Questionnaire

1) <b>Company/Facility Name</b>	Grain Elevator Inc			1a) Form INV-5	Page		of	
2) <b>Emission Point No.</b>	EP-2	3)	<b>Emission Unit No.</b>	EU-2				
4) <b>Calculations are provided in support of information reported on Form INV -</b>	3	<input checked="" type="checkbox"/>	4	<input type="checkbox"/>	for the Emission Point and Emission Unit listed above.			
5) <b>Emissions Calculations</b>								

This methodology should be followed for column grain dryers (grain drying process) at grain elevators:

Maximum hourly design rate of column grain dryer = 84 tons/hr

PM<sub>2.5</sub> emission factor for column grain drying per AP-42, Table 9.9.1-1 = .0094 lbs/ton (uncontrolled factor)

PM<sub>10</sub> emission factor for column grain drying per AP-42, Table 9.9.1-1 = .055 lbs/ton (uncontrolled factor)

**Potential hourly uncontrolled emissions:**

PM<sub>2.5</sub> = 84 tons/hr x .0094 lbs/ton = .79 lbs/hr

PM<sub>10</sub> = 84 tons/hr x .055 lbs/ton = 4.62 lbs/hr

**Potential annual emissions:**

To calculate PM<sub>2.5</sub> and PM<sub>10</sub> potential annual emissions multiply the highest actual grain throughput from the last five years by 1.2. Multiply the adjusted actual throughput by the emission factor and divide by 2,000.

Highest actual throughput in the last five years = 416,667 tons/yr

416,667 tons/yr x 1.2 = 500,000 tons/yr

PM<sub>2.5</sub> = 500,000 tons/yr x .0094 lbs/ton x 1 ton/2,000 lbs = 2.35 tons/yr

PM<sub>10</sub> = 500,000 tons/yr x .055 lbs/ton x 1 ton/2,000 lbs = 13.75 tons/yr

## Form INV-5 CALCULATIONS

Duplicate this form for each Form it will  
accompany in the Questionnaire

1) <b>Company/Facility Name</b>	Grain Elevator Inc			1a) Form INV-5	Page		of	
2) <b>Emission Point No.</b>	EP-2	3)	<b>Emission Unit No.</b>	EU-2				
4) <b>Calculations are provided in support of information reported on Form INV -</b>	3	<input checked="" type="checkbox"/>	4	<input type="checkbox"/>	for the Emission Point and Emission Unit listed above.			
5) <b>Emissions Calculations</b>								

This methodology should be followed for column grain dryers (natural gas combustion process) at grain elevators:

Maximum hourly design rate of column grain dryer = .0933 MMcf/hr

SO<sub>2</sub> emission factor per AP-42, Table 1.4-2 = 0.6 lbs/MMcf (uncontrolled factor)

NO<sub>x</sub> emission factor per AP-42, Table 1.4-1 = 100 lbs/MMcf (uncontrolled factor)

VOC emission factor per AP-42, Table 1.4-2 = 5.5 lbs/MMcf (uncontrolled factor)

CO emission factor per AP-42, Table 1.4-1 = 84 lbs/MMcf (uncontrolled factor)

NH<sub>3</sub> emission factor per WebFIRE, SCC number 10200602 = 3.2 lbs/MMcf (uncontrolled factor)

Hexane emission factor per AP-42, Table 1.4-3 = 1.8 lbs/MMcf (uncontrolled factor)

Formaldehyde emission factor per AP-42, Table 1.4-3 = .075 lbs/MMcf (uncontrolled factor)

**Potential hourly uncontrolled emissions:**

SO<sub>2</sub> = .0933 MMcf/hr x 0.6 lbs/MMcf = .06 lbs/hr

NO<sub>x</sub> = .0933 MMcf/hr x 100 lbs/MMcf = 9.33 lbs/hr

VOC = .0933 MMcf/hr x 5.5 lbs/MMcf = .51 lbs/hr

CO = .0933 MMcf/hr x 84 lbs/MMcf = 7.84 lbs/hr

NH<sub>3</sub> = .0933 MMcf/hr x 3.2 lbs/MMcf = .30 lbs/hr

Hexane = .0933 MMcf/hr x 1.8 lbs/MMcf = .17 lbs/hr

Formaldehyde = .0933 MMcf/hr x .075 lbs/MMcf = .01 lbs/hr

**Potential annual emissions:**

To calculate potential annual emissions multiply the highest actual grain throughput from the last five years by 1.2. Multiply the adjusted actual throughput by the fuel to grain ratio (.607 MMBtu/ton) and then by the emission factor and divide by 2,000.

Highest actual throughput in the last five years = 416,667 tons/yr

416,667 tons/yr x 1.2 = 500,000 tons/yr

500,000 tons/yr x .607 MMBtu/ton x MMcf/1,050 MMBtu = 289.05 MMcf/yr

SO<sub>2</sub> = 289.05 MMcf/yr x 0.6 lbs/MMcf x 1 ton/2,000 lbs = .09 tons/yr

NO<sub>x</sub> = 289.05 MMcf/yr x 100 lbs/MMcf x 1 ton/2,000 lbs = 14.45 tons/yr

VOC = 289.05 MMcf/yr x 5.5 lbs/MMcf x 1 ton/2,000 lbs = .79 tons/yr

CO = 289.05 MMcf/yr x 84 lbs/MMcf x 1 ton/2,000 lbs = 12.14 tons/yr

NH<sub>3</sub> = 289.05 MMcf/yr x 3.2 lbs/MMcf x 1 ton/2,000 lbs = .46 tons/yr

## Form INV-5 CALCULATIONS

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accompany in the Questionnaire

1) <b>Company</b> /Facility Name	Grain Elevator Inc			1a) Form INV-5	Page		of	
2) Emission Point No.	EP-2	3)	Emission Unit No.	EU-2				
4) Calculations are provided in support of information reported on Form INV -		3	<input checked="" type="checkbox"/>	4	<input type="checkbox"/>	for the Emission Point and Emission Unit listed above.		
5) Emissions Calculations								

**Potential annual emissions (continued):**

To calculate potential annual emissions multiply the highest actual grain throughput from the last five years by 1.2. Multiply the adjusted actual throughput by the fuel to grain ratio (.607 MMBtu/ton) and then by the emission factor and divide by 2,000.

Highest actual throughput in the last five years = 416,667 tons/yr

416,667 tons/yr x 1.2 = 500,000 tons/yr

500,000 tons/yr x .607 MMBtu/ton x MMcf/1,050 MMBtu = 289.05 MMcf/yr

Hexane = 289.05 MMcf/yr x 1.8 lbs/MMcf x 1 ton/2,000 lbs = .26 tons/yr

Formaldehyde = 289.05 MMcf/yr x .075 lbs/MMcf x 1 ton/2,000 lbs = .01 tons/yr

## Form INV-5 CALCULATIONS

Duplicate this form for each Form it will  
accompany in the Questionnaire

1) <b>Company</b> /Facility Name	Grain Elevator Inc			1a) Form INV-5	Page		of	
2) Emission Point No.	EP-2	3)	Emission Unit No.	EU-2				
4) Calculations are provided in support of information reported on Form INV -		3	<input type="checkbox"/>	4	<input checked="" type="checkbox"/>	for the Emission Point and Emission Unit listed above.		
5) Emissions Calculations								

This methodology should be followed for column grain dryers (grain drying process) at grain elevators:

Actual emissions from all processes at Group 2 Grain Elevators should be calculated using actual throughput data from the applicable emission year.

**Actual emissions:**

To calculate actual emissions, multiply the actual grain throughput by the appropriate emission factor and divide by 2,000.

$$PM_{2.5} = 25,000 \text{ tons} \times .0094 \text{ lbs/ton} \times 1 \text{ ton}/2,000 \text{ lbs} = .12 \text{ tons}$$

$$PM_{10} = 25,000 \text{ tons} \times .055 \text{ lbs/ton} \times 1 \text{ ton}/2,000 \text{ lbs} = .69 \text{ tons}$$

## Form INV-5 CALCULATIONS

Duplicate this form for each Form it will  
accompany in the Questionnaire

1) <b>Company/Facility Name</b>	Grain Elevator Inc			1a) Form INV-5	Page		of	
2) <b>Emission Point No.</b>	EP-2	3)	<b>Emission Unit No.</b>	EU-2				
4) <b>Calculations are provided in support of information reported on Form INV -</b>	3 <input type="checkbox"/>	4 <input checked="" type="checkbox"/>	for the Emission Point and Emission Unit listed above.					
5) <b>Emissions Calculations</b>								

This methodology should be followed for column grain dryers (natural gas combustion process) at grain elevators:

Actual emissions from all processes at Group 2 Grain Elevators should be calculated using actual throughput data from the applicable emission year.

**Actual emissions:**

To calculate actual emissions, multiply the actual natural gas throughput by the appropriate emission factor and divide by 2,000.

$$\text{SO}_2 = 17.75 \text{ MMcf} \times 0.6 \text{ lbs/MMcf} \times 1 \text{ ton}/2,000 \text{ lbs} = .01 \text{ tons}$$

$$\text{NO}_x = 17.75 \text{ MMcf} \times 100 \text{ lbs/MMcf} \times 1 \text{ ton}/2,000 \text{ lbs} = .89 \text{ tons}$$

$$\text{VOC} = 17.75 \text{ MMcf} \times 5.5 \text{ lbs/MMcf} \times 1 \text{ ton}/2,000 \text{ lbs} = .05 \text{ tons}$$

$$\text{CO} = 17.75 \text{ MMcf} \times 84 \text{ lbs/MMcf} \times 1 \text{ ton}/2,000 \text{ lbs} = .75 \text{ tons}$$

$$\text{NH}_3 = 17.75 \text{ MMcf} \times 3.2 \text{ lbs/MMcf} \times 1 \text{ ton}/2,000 \text{ lbs} = .03 \text{ tons}$$

$$\text{Hexane} = 17.75 \text{ MMcf} \times 1.8 \text{ lbs/MMcf} \times 1 \text{ ton}/2,000 \text{ lbs} = .02 \text{ tons}$$

$$\text{Formaldehyde} = 17.75 \text{ MMcf} \times .075 \text{ lbs/MMcf} \times 1 \text{ ton}/2,000 \text{ lbs} = .00 \text{ tons}$$